PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Goretta, et al.
Title:	"JOINING OF ADVANCED MATERIALS BY PLASTIC DEFORMATION"
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REPLACEMENT AMENDMENT-CLAIMS

Dear Sir:

The Applicant sincerely appreciates the courtesy extended by Examiner Tran on August 7, 2003 in the above-identified matter. Pursuant to the Examiner's request, the Applicants submit the following amendment to claim 7, as suggested by the Examiner:

IN THE CLAIMS:

Please amend claim 7 as follows:

7. (Thric Amend d) A method for producing a construct by seamlessly joining solid objects made up of certain sized particles, the method *comprising:*

a) supplying a joint compound having particle sizes smaller than the certain sized particles, wherein the joint compound contains metal;

b) applying the joining compound to opposing surfaces of the objects to be joined together;

c) heating the joint to a heating temperature below the melting point of a lowest melting point constituent of the objects and the joint compound, wherein the joint compound does not melt;

d) applying pressure to the objects so as to direct the opposing surfaces toward each other, whereby the joint compound is intermediate the opposing surfaces

Please add claim 26 as follows:

26. The method as recited in claim 7 wherein a constituent of the joint compound or the objects comprise 65 percent or more by volume of a phase that exhibits superplastic flow at the heating temperature.

Respectfully submitted,
CHERSKOV & FLAYNIK

By _____
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Claims 1-6 (canceled)

Claim 7 (currently amended) A method for producing a construct by seamlessly joining solid objects made up of certain sized particles, the method comprising:

a. supplying a joint compound having particle sizes smaller than the certain sized particles, wherein the joint compound contains metal;

b. applying the joining compound to opposing surfaces of the objects to be joined together;

c. heating the joint to a heating temperature below the melting point of a lowest melting point constituent of the objects and the joint compound, wherein the joint compound does not melt;

d. applying pressure to the objects so as to direct the opposing surfaces toward each other, whereby the joint compound is intermediate the opposing surfaces

Claim 8 (Previously Amended) The method as recited in claim 7 wherein the melting temperature of the lowest melting point constituent of the construct is T_m and the heating temperature is $0.5T_m$ to $0.7\ T_m$.

Claim 9 (original) The method as recited in claim 7 wherein the pressure is between 500 psi and 45,000 psi.

Claim 10 (previously amended) The method as recited in claim 7 wherein the applied pressure and heating temperature are applied at an inverse relationship to each other.

Claim 11 (previously amended) The method as recited in claim 7 wh rein the solid objects are comprised of multiphase materials s lected from the group consisting of

ceramics, glass ceramics, intermetallic compounds, metals, and combinations thereof.

Claim 12 (previously amended) The method as recited in claim 7 wherein the solid objects are two-phase bodies and wherein the volume percent of one phase to the other phase varies from 2 to 98.

Claim 13 (original) The method as recited in claim 7 wherein the joint compound is applied to a thickness that is at least five times the dimension of the largest particles contained in the joint compound.

Claim 14 (original) A method for seamlessly joining together objects made of cermet, the method comprising:

a) selecting opposing surfaces of the objects having surface finishes as defined by root-mean-square values of less than 50 microns;
b) coating the surfaces with a fluid containing a metal;
c) decomposing the metal solution so as to leave a metal residue on the surfaces; and
d) contacting the surfaces to each other for a time and at a temperature and pressure sufficient to form an irreversible bond between the objects.

Claim 15 (original) The method as recited in claim 14 wherein the metal solution contains a metal identical to a metal contained in the objects.

Claim 16 (original) The method as recited in claim 14 wherein the metal is Ti, or Co, or Fe, or Mn, or Zr, or Ti-alloy, or Co-alloy, or Fe-alloy, or Mn-alloy, or combinations thereof.

Claim 17 (original) The method as recited in claim 15 wh r in the fluid is a metal solution selected from the group consisting of metallic nitrates, metallic acetates,

metallic hydroxides, metallic alkoxides, colloidal suspension of metals in solvents, or combinations thereof.

Claim 18 (original) The method as recited in claim 14 wherein the residue has a thickness of five microns or less.

Claim 19 (original) The method as recited in claim 14 wherein the fluid contains suspended hard particles, the particles selected from the group consisting of WC, TiC, TiN, or combinations thereof.

Claim 20 (original) The method as recited in claim 19 wherein the suspended particles are less than or equal to 2 microns in diameter.

Claim 21 (original) The method as recited in claim 14 wherein the residue has a thickness of less than or equal to 10 microns.

Claims 22-24 (canceled)

Claim 25 (previously added) The method as recited in claim 7 wherein the construct is heated to approximately 50-60 percent of the melting temperature of the lowest melting temperature constituent.

Claim 26 (new) The method as recited in claim 7 wherein a constituent of the joint compound or the objects comprise 65 percent or more by volume of a phase that exhibits superplastic flow at the heating temperature.